

## WHAT IS CLAIMED IS:

1. A method for estimating incurred but not yet paid (IBNP) claim amounts, the method comprising:

- a) accessing a set of historical data for each of a plurality of incurred periods and paid periods prior to a valuation date, an incurred period being a time period in which a claim is incurred and a paid period being a time period in which the incurred claim is paid, the set of historical data comprising a paid lag claim amount for each combination of incurred and paid periods, the paid lag claim amount being a total actual amount of claims incurred in a given incurred period and paid a given lag time later in a given paid period, the lag time being a measure of elapsed time from a point in the given incurred period to the given paid period;
- b) identifying a functional relationship between cumulative paid lag claim amounts and paid lag claim amounts, wherein the functional relationship has one or more adjustable parameters, the cumulative paid lag claim amounts are independent variables with a cumulative paid lag claim amount for a selected incurred period being the sum of paid lag claim amounts for one or more paid periods or the sum of paid lag claim amounts for one or more paid periods multiplied by a weighting factor, and the paid lag claim amounts are dependent variables;
- c) adjusting the one or more adjustable parameters to obtain optimized parameters such that a predetermined function of differences between calculated paid lag claim amounts and actual paid lag claim amounts is minimized; and
- d) estimating IBNP claim amounts for each combination of incurred periods and paid periods after the valuation date, the estimated IBNP claim amounts being a projected paid claim amount calculated from the functional relationship with the optimized parameters of step c), for each paid period after the valuation date, from the cumulative paid lag claim amounts for each incurred period as of the valuation date.

2. The method of claim 1 further comprising:

e) calculating an incurred period IBNP claim amount for each incurred period by summing IBNP claim amounts estimated in step d over all paid periods after the valuation date for each incurred period before the valuation date.

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3. The method of claim 2, further comprising estimating a total IBNP liability reserve amount as of the valuation date by summing the incurred period IBNP claim amounts over all incurred periods prior to the valuation date.

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4. The method of claim 1 further comprising

f) calculating a paid period IBNP claim amount for each paid period after the valuation date by summing IBNP claim amounts estimated in step d over all incurred periods before the valuation date for each paid period after the valuation date.

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5. The method of claim 4, further comprising estimating a total IBNP liability reserve amount by summing the paid period IBNP claim amounts over all paid periods after the valuation date.

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6. The method of claim 1 wherein each of the plurality of incurred periods has an associated number of exposures and the weighting factor in step b for each of the plurality of incurred periods is 1 divided by the associated number of exposures, thereby producing per exposure paid lag claim amounts, the cumulative paid lag claim amounts are the per exposure cumulative paid lag claim amounts, and the IBNP claim amounts are the per exposure IBNP claim amounts.

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7. The method of claim 6 further comprising

g) calculating an incurred period IBNP claim amount for each incurred period by summing, over all paid periods after the valuation date, the product of the per exposure IBNP claim amount for the given paid period times the number of exposures for that incurred period.

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8. The method of claim 7, further comprising estimating a total IBNP liability reserve amount by summing the incurred period IBNP claim amount over all incurred periods.

9. The method of claim 6 further comprising

h) calculating a paid period IBNP claim amount for each paid period after the valuation date by summing, over all incurred periods before the valuation date for the respective paid periods, the product of the per exposure IBNP claim amount for the given paid period times the number of exposures for the respective incurred periods.

10. The method of claim 9, further comprising estimating a total IBNP liability reserve amount by summing the paid period IBNP claim amounts over all paid periods.

11. The method of claim 1 wherein step c is performed by a least squares regression.

12. A computer system executing the method of claim 1.

13. The method of claim 1, further comprising adjusting the paid lag claim amount for an effect of trend or seasonality.

14. The method of claim 13, further comprising adjusting the projected lag claim amount for an effect of trend or seasonality.

15. A method for estimating incurred but not yet paid (IBNP) claim amounts, the method comprising:

- a) accessing a set of historical data for each of a plurality of incurred periods and paid periods prior to a valuation date, an incurred period being a time period in which a claim is incurred and a paid period being a time period in which the incurred claim is paid, the set of historical data comprising a paid lag claim amount for each combination of incurred and paid periods, the paid lag claim amount being a total actual amount of claims incurred in a given incurred period and paid a given lag time later in a given paid period, the lag time being a measure of elapsed time from a point in the given incurred period to the given paid period;
- b) calculating a summed paid lag claim amount for a selected lag time that is equal to the sum of paid lag claim amounts for incurred periods times an incurred month specific weighting factor as of the valuation date for the

- selected lag time, the incurred month specific weighting factor being set to a predetermined value for each incurred month;
- 5           c)     calculating a summed exposure amount that is the sum of exposures for each incurred period times the incurred month specific weighting factor that is used to calculate the summed paid lag claim amount; and
- d)     estimating a weighted average per exposure IBNP claim amount for each lag time by dividing the summed paid lag claim amount by the summed exposure amount.
- 10       16.    The method of claims 15 further comprising:
- e)     calculating an incurred period IBNP claim amount for each incurred period by summing IBNP claim amounts estimated in step d over all paid periods after the valuation date for each incurred period before the valuation date.
- 15       17.    The method of claim 15 wherein the incurred month specific weighting factor is equal to one and the IBNP claim amounts are average per exposure paid lag claim amount.
- 20       18.    The method of claim 15, further comprising estimating a total IBNP liability reserve amount by summing the incurred period IBNP claim amount over all incurred periods.
19.    The method of claim 15, further comprising adjusting the paid lag claim amount for an effect of trend or seasonality.
- 25       20.    The method of claim 15, further comprising adjusting the projected IBNP claim amount for an effect of trend or seasonality.
- 30       21.    A computer-implemented method for estimating incurred but not yet paid (IBNP) claim amounts, the method comprising:
- a)     providing a computer system for executing the computer-implemented method, the computer system having computer memory for accessibly storing data and a processor for processing data;

- 5                   b)           accessing a set of historical data for each of a plurality of incurred periods and paid periods prior to a valuation date, an incurred period being a time period in which a claim is incurred and a paid period being a time period in which the incurred claim is paid, the set of historical data comprising a paid lag claim amount for each combination of incurred and paid periods, the paid lag claim amount being a total actual amount of claims incurred in a given incurred period and paid a given lag time later in a given paid period, the lag time being a measure of elapsed time from a point in the given incurred period to the given paid period;
- 10               c)           identifying a functional relationship between cumulative paid lag claim amounts and paid lag claim amounts, wherein the functional relationship has one or more adjustable parameters, the cumulative paid lag claim amounts are independent variables and are the sum of paid lag claim amounts for one or more paid periods or the sum of paid lag claim amounts for one or more paid
- 15                                   periods multiplied by a weighting factor, and the paid lag claim amounts are dependent variables;
- d)           adjusting the one or more adjustable parameters to obtain optimized parameters such that a predetermined function of differences between calculated paid lag claim amounts and actual paid lag claim amounts is minimized; and
- 20               e)           estimating IBNP claim amounts for each combination of incurred periods and paid periods after the valuation date, the IBNP claim amounts being a projected paid claim amount calculated from the functional relationship with the optimized parameters of step c, for each paid period after the valuation date, from the cumulative paid lag claim amounts for each incurred period as of the
- 25                                   valuation date.
22.               The method of claim 21 further comprising:
- f)           calculating an incurred period IBNP claim amount for each incurred period by summing IBNP claim amounts estimated in step d over all paid periods after the
- 30                                   valuation date for each incurred period, and storing the incurred period claim amount in the computer memory.

23. The method of claim 22, further comprising estimating a total IBNP liability reserve amount by summing the incurred period IBNP claim amount over all incurred periods and storing the total IBNP reserve amount in the computer memory.

24. The method of claim 21 further comprising

g) calculating a paid period IBNP claim amount for each paid period by summing IBNP claim amounts estimated in step d over all incurred periods after the valuation date for each paid period and storing the paid period IBNP amount in the computer memory.

25. The method of claim 24, further comprising estimating a total IBNP liability reserve amount by summing the paid period IBNP claim amounts over all paid periods.

26. The method of claim 21 wherein each of the plurality of incurred periods has an associated number of exposures and the weighting factor in step b for each of the plurality of incurred periods is 1 divided by the associated number of exposures, the cumulative paid lag claim amounts are the per exposure cumulative paid lag claim amounts, the paid lag claim amounts are the per exposure paid lag claim amounts, and the IBNP claim amounts are the per exposure IBNP claim amounts.

27. The method of claim 26 further comprising

h) calculating an incurred period IBNP claim amount for each incurred period by summing, over all paid periods after the valuation date, the product of the per exposure IBNP claim amount for the given paid period times the number of exposures for that incurred period.

28. The method of claim 27, further comprising estimating a total IBNP liability reserve amount by summing the incurred period IBNP claim amount over all incurred periods.

29. The method of claim 26 further comprising

i) calculating a paid period IBNP claim amount for each paid period after the valuation date by summing, over all incurred periods before the valuation date for the respective paid periods, the product of the per exposure IBNP claim amount

for the given paid period times the number of exposures for the respective incurred periods.

30. The method of claim 29, further comprising estimating a total IBNP liability  
5 reserve amount by summing the paid period IBNP claim amounts over all paid periods.

31. The method of claim 21 wherein step c is performed by a least squares regression.

32. A computer system executing the method of claim 21.

10 33. The method of claim 21, further comprising adjusting the paid lag claim amount for an effect of trend or seasonality.

15 34. The method of claim 21, further comprising adjusting the projected IBNP claim amount for an effect of trend or seasonality.